Unit 5

Regular Maintenance of an Engine

Driving a car can be fun, but its maintenance is also important. A planned preventive maintenance regime can reduce running costs and prolong the life of a vehicle.

Changing the engine oil and filter on a regular basis is the most important step for maintenance. The additives in the engine oil get exhausted with time and may lead to heating up of engine and cause damage.

Pumping up and maintaining the tyre pressure is also another important step. Insufficient air in tyres can cause wearing and overjelling can cause bursting of tyres. Therefore, recommended inflation pressure should be considered while filling air in tyres.

In this unit we will understand the importance of maintenance of a vehicle.

Fig. 5.1: Engine

Session 1: Inspection of an Engine

When it comes to a car, the most important component is its engine—the soul of a car. In fact, you may have a maintained and sparkling set of wheels in your car, but if its engine is not working, it is as good as waste. In order to make sure that your car has a long life, you should maintain your vehicle regularly. Engine is a power producing unit in automobile system, where fuel is burnt to create heat energy and that heat energy is converted into kinetic energy. It is a complex unit with different parts, which work together and produce power for the movement of a vehicle.

One must regularly check the engine for leakages as:

- the leakage of combustible gases can reduce the mileage and pick-up.
- the leakage of coolants can affect the engine's temperature and cause overheating, due to which the parts can deteriorate.
- the leakage of the lubricating oil can increase the friction and reduce the engine's power output. Such leakages must be repaired in time to avoid failure of the engine.

Selective Procedure to Check the Leakage in a Vehicle's Engine

- Keep the vehicle on a hard surface.
- Open the engine bonnet and support with lever.
- Follow the steps given for checking the leakages.

Air cooled system leakage

Green colour is mentioned below point, it symbolises that there are chances of coolant leakage.

- Inspect its connections and the coolant tank.
- Inspect the radiator hose clips for looseness and if leakage is noticed, tighten the clips.
- Check the hose pipeline for distortion and deterioration and replace.
- Inspect the radiator cap, neck and radiator core for coolant leakage.
- Inspect for torn thermostat housing gasket, which may cause leakage.
- Inspect water pump seals and gasket for leakage of coolant.

Fuel leakage

Fuel leakage can be caused due to evaporation of fuel or broken or loose fuel line convection. It causes spot of fuel underneath the car along with a strong smell. It reduces the mileage of vehicle.

Following areas must be inspected for fuel leakage

- Fuel tank exit and tank cap or rubber washer
- Flexible fuel line for slackness
- Torn fuel filter gasket or loose fuel filter
- Fuel pump connections and connectors
- Loose connection at nozzle or carburetor areas

Leakage of combustion gases

The leakage of combustion gases may be traced when black soot is noticed around the following areas of an engine:

- Cylinder head and block
- Torn cylinder head gasket
- Spark plug or nozzle
- Engine induction and exhaust manifold
- Value guide or improper tappet clearance

Lubricating oil leakage

The leakage of lubricating oil can be traced by following a few simple steps.

- Set a newspaper under the engine.
- Now run the engine for 5 min (do not move the vehicle).
- The newspaper will have spots if there is leakage.
- Exactly perpendicular to the spot will be the area of leakage. Stop the leakage by changing the gasket oil seal, etc.

Practical Exercise

1. List the types of leakages found in an engine.

S.No.	Types of leakage

Check Your Progress

A. Fill in the blanks

1. For fuel leakage ______________, ______________ and ______________ must be checked in the engine.
2. Check the hose pipe for ______________ or deterioration.
3. Inspect the radiator cap, neck and radiator core for ______________ leakage.
4. Inspect radiator hose clips for _____________, if leakage is noticed, ______________ the clips.

B. Multiple choice questions

1. What is the power producing unit in an Automobile System?
   (a) Engine
   (b) Chassis
   (c) Piston
   (d) Connecting rod
2. Which colour indicates that there are chances of coolant leakage?
   (a) Green
   (b) Blue
   (c) Yellow
   (d) None of the above
3. Engine is where fuel is burnt to create heat energy and that heat energy is converted into ____________________.
   (a) kinetic energy
   (b) dynamic Energy
   (c) static energy
   (d) thermal energy

C. Answer the following questions

1. Why must leakages be controlled?
2. What are the steps to be followed while checking the leakages in an engine?

SESSION 2: WASHING OF AN ENGINE

The modern automobile is captured with latest technology. So, while providing services like engine washing, care must be taken to avoid damaging the components.

The latest engines are compact and fitted in a small area. It is necessary to clean the engine at regular intervals to take away oily layers, depositions of muck

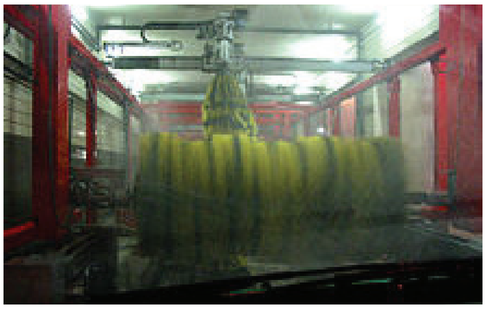

Fig. 5.2: Automatic car washing unit

(mud and water), which may cause the engine heat and deteriorate its performance.

Material and Equipment Required to Clean Engine

- Car washer
- Compressor
- Diesel sprayer gun, etc.

Steps to clean or wash the engine

- Keep the vehicle on a hard surface.
- Unlock the engine bonnet and support with lever.
- Inspect for external leakage of oil, coolant, gases, locate the area.
- Allow the engine to reach atmospheric temperature.
- Separate the negative terminal of battery for protection.
- Now use a diesel sprayer and spray only on oily layer of the engine.
- Now control the car washer and set the water spraying nozzle at a low force.
- Spray the water and remove the oily layers and muck water from an engine.
- Now, take some liquid soap and apply the soap gradually in the area where the hand can reach.
- Again, with low water pressure, clean the engine externally.
- Also clean the bonnet area and engine room.
- Now, start the compressor and give air pressure to remove the water from the electrical and electronic gadgets.
- Allow the engine to dry.
- Connect the battery terminal and start the engine and check for smooth working.

Precautions

- Do not use high pressure to clean engine.
- Safeguard sensors, spark plugs, nozzle and electronic gadgets from water.
- Do not give water pressure when engine is in running condition.

- Do not clean the engine when it is hot.
- Do not blow air at high pressure.

Practical Exercise

1. List the elements of safeguard during engine washing.

Sr. No.	Elements

Check Your Progress

A. Fill in the blanks

1. Latest engines are __________ and fitted in the small area.
2. __________ is used for washing the engine.
3. Spray __________ and remove the oily layers and muck water from an __________.
4. Liquid soap should be applied slowly in the __________ where the hand can reach.
5. Do not clean the __________ when it is hot.

B. Multiple choice questions

1. Which of these is required to clean the engine?
   (a) Car washer
   (b) Compressor
   (c) Diesel sprayer gun
   (d) All of the above
2. What are the steps to clean or wash the engine?
   (a) Keep the vehicle on hard surface
   (b) Unlock the engine bonnet and hold up it properly
   (c) Allow the engine to reach atmospheric temperature
   (d) All of the above
3. What type of precaution should be taken for washing of engine?
   (a) Do not use high pressure to clean engine
   (b) Safeguard sensors, spark plugs, nozzle, and electronic gadgets from water

(c) Do not give water pressure when engine is in running condition

(d) All of the above

C. Answer the following questions

1. Why is washing the engine necessary?
2. List the steps to be followed while washing the engine.

SESSION 3: TUNING FUEL SYSTEM OF AN ENGINE

Engine tuning is the adjustment or modification of the internal combustion engine or Engine Control Unit (ECU) to yield optimal performance and increase the engine's power output, economy, or durability.

It is necessary to inspect and adjust the following systems of an engine:

- Fuel system
- Ignition system
- Cooling system
- Lubrication system
- Mechanical system

Steps for fuel tuning

- Clean air cleaner and fuel filter regularly
- Remove the tank cap
- Inspect the rubber washer
- Clean the vent hole to maintain atmospheric pressure on the fuel
- Now inspect the fuel line for leakage and if flexible fuel line is damaged, replace immediately
- Inspect the suction or vacuum of fuel pump.
- Check the fuel pump pressure
- Compare reading with specification as specified in the service manual

Setting idle speed of an engine

- Warm up the engine and turn the idle speed screw in clockwise direction for the engine RPM to increase.
- Slowly turn the idle speed screw in the anticlockwise direction till you get the prescribed RPM.
- Use tachometer to read RPM.

- Now, turn the air screw in clockwise direction so that the engine stops.
- Slowly open the screw and start the engine till we get recommended the RPM of an engine.

Nozzle pressure test

- Remove the injector or nozzle from the engine.
- Hold the container and lower the injector or nozzle.
- Join the fuel pipe to the nozzle and start the engine
- Observe the injector or nozzle spray, if proper, fix it back to the cylinder head.
- Repeat for all cylinders

(If pressure is noticed less than necessary, calibrate the FIP pump.)

Precautions

- Do not pull out the flexible pipe connection.
- Do not over tighten the fuel line connection.
- Do not twist the fuel line.
- Do not work on the fuel system with flame or park.
- Change the gaskets to avoid evaporation of fuel after regular intervals.

Practical Exercise

1. List the steps used in tuning of fuel system.

Sr. No.	Steps used

Check Your Progress

A. Fill in the blanks

1. ____________ is the adjustment or modification of the internal combustion engine.
2. Warm up the ________ and turn the idle speed screw in _________ direction to increase the engine's RPM.
3. Use ____________ to read RPM.
4. Injector or nozzle is used in a(an) _________.

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B. Multiple choice questions

1. ___________ is the adjustment or modification of the internal combustion engine.
   (a) Tuning
   (b) Fuel system
   (c) Ignition system
   (d) Cooling system
2. Which of these is a step for fuel tuning?
   (a) Clean air cleaner and fuel filter regularly
   (b) Remove the tank cap
   (c) Inspect the rubber washer
   (d) All of the above
3. Which of these is a step of nozzle pressure test?
   (a) Remove the injector or nozzle from an engine
   (b) Hold container and lower the injector or nozzle
   (c) Join the fuel pipe to the nozzle and start the engine
   (d) All of the above

C. Answer the following questions

1. Why is tuning necessary?
2. What are the steps to be followed while tuning the fuel system?
3. What are the advantages of tuning?

SESSION 4: TUNING OF IGNITION SYSTEM OF AN ENGINE

The ignition system plays an important role in the process of combustion. The system converts current from 12 volt to 20,000 volt. To ignite the charge, the advance spark or retarded spark leads to imbalanced combustion, which in turn affects the engine's performance and changes the engine tune. The thin wires supply current between 12 volt and are called low tension leads. The thick wires supply current of 20–25,000 volt and are called high tension leads.

The ignition system is classified as — primary circuit with LT leads and secondary circuit with HT leads. The connection from battery to ignition switch to HT coil and to the distributor – CDI comes under primary circuit.

Basic Steps for Tuning of Ignition System

- Inspect loose contact of the battery terminal
- Inspect the socket connection for slackness
- Check the connection to ignition switch
- Check the primary circuit of LT lead while inspecting connection
- Inspect the connection with pick-up coil and CDI unit
- Disconnect the sparkplug connection
- Now remove the distributor cap and check the HT lead for loose connections
- Check slot machine contact point for erosion or burn
- Inspect working of spark advance mechanism
- Clean distributor cap and fix it properly
- Using appropriate spanner loosen the spark plug slowly from each cylinder
- Inspect the spark plug condition
  - Black soot: rich mixture – cold engine
  - Dead white soot: lean mixture – hot engine
  - Brownish colour: normal
- Check for eroded central electrode and make it straight to maintain air gap
- Check for deposition and clean the plug with sand blast machine or emery paper
- Using wire feeler gauge, set the spark plug gap as per the specification
- Clean the spark plug threads
- Apply oil and check spark plug sealing gasket washer, if needed replace it
- To install plug, first fix it with hand
- Thread it smoothly and tighten the same with specified torque
- Connect the lead wire with plug
- Start the engine and check the engine sound and ascertain if there is any change in engine sound

Practical Exercise

1. List the steps used in tuning of ignition system.

S.No.	Steps used

Check Your Progress

A. Fill in the blanks

1. The ignition system plays an important role in process of ________________.
2. Ignition system is classified in two ways __________ circuit with LT leads and ____________ circuit with HT leads.

B. Multiple choice questions

1. The ignition system converts current from ____________________.
   (a) 12 volt to 20,000 volt
   (b) 13 volt to 40,000 volt
   (c) 14 volt to 30000 volt
   (d) None of the above
2. Thin wires and their connections supply current between 12 volt and are called _________________.
   (a) low tension leads
   (b) high tension leads
   (c) multi volts
   (d) None of the above
3. The thick wires supply current of 20–25,000 volt and are called ______________.
   (a) High Tension Leads
   (b) Low Tension Leads
   (c) 12volt to 20,000 volt
   (d) All of the above

C. Answer the following questions

1. Why is tuning of ignition system of engine necessary?
2. What are the steps to be followed while tuning the ignition system of an engine?

SESSION 5: TUNING OF LUBRICATION SYSTEM OF AN ENGINE

Lubrication plays a key role in the life expectancy of an automotive engine. It reduces wear or friction, heat, and clean engine parts, gives cushioning effect and fills the gap.

The engine lubrication system works on a pressurised system, in which the oil sump stores and collects the circulated lubricating oil. The oil pump circulates the lubricating oil to the engine components at the recommended pressure and controls by salty valve. The role of oil filter and strainer is to filter the circulated lubricating oil and re-circulate the same.

The lack of lubrication may lead to a noisy engine and also change the tune of the engine due to increased in friction. Thus, it is necessary to check the lubricating oil at specified intervals. Also change the lubricating oil if the oil looses viscosity or after the recommended interval of distance in kilometres.

Tuning Procedure

Slowly remove the dip stick from the sump and wipe it with cotton waste.

Now check the level on the dip stick and if it is low, check the quality of oil. If it is heavy, the quality of oil viscosity is better, now add the oil for proper level. If the oil is black, it lacks viscosity. Then change the oil and oil filter.

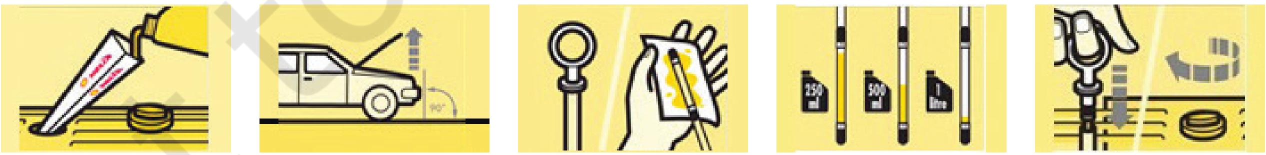

Fig. 5.3: Checking of Engine Oil

Fig. 5.4: Filling of Oil

Changing the Oil

- Bring the vehicle on lubrication bay and place the container below the drain plug.
- Using specified spanners, loosen the drain plug and drain the oil in container.
- Switch on the engine for 3 seconds so that engine becomes warm. It will remove any oil present in pores of the engine and the oil will be drained out easily.
- Fix the plug with a new washer and tighten the same with specified torque.
- Refill the lubricating oil from filler plug with the recommended quantity and quality.

Fig. 5.5: Changing of Oil Filter

Changing of Oil Filter

- Slowly remove the oil filter.
- Use rubber gasket of appropriate size and place the gasket in the housing groove. Check the gasket for any deformity or tear.
- Now, fix the new oil filter tightly at the specified torque.

Measuring Oil Pressure

- Start and run the engine to achieve optimum temperature.
- Check the oil pressure on pressure gauge and compare with the service manual.

Practical Exercise

1. List the steps used in tuning of engine lubrication system.

S.No.	Steps used

2. Draw the line diagram of engine lubrication system.

Check Your Progress

A. Fill in the blanks

1. ____________ is used for lubricating the engine of a vehicle.
2. The lack of _________ may lead to a noisy engine and also change the ________ of the engine due to increase in __________.
3. Change the ___________ oil, if it looses viscosity or after recommended distance of _______________.

B. Multiple choice questions

1. The engine lubrication system works on ____________.
   (a) pressurised lubrication system
   (b) compressed air system
   (c) mixed hydraulic system
   (d) None of the above
2. The role of oil filters and oil strainer in engine lubrication system is to _____________________________________.
   (a) filter the circulated lubricating oil
   (b) filter the circulated fuel
   (c) filter the circulated air-fuel mixture
   (d) None of the above

3. If oil quality is good, it means ________________.
    (a) viscosity is high
    (b) pressure is low
    (c) lack of viscosity
    (d) None of the above

C. Answer the following questions

1. Why is engine lubrication necessary?
2. What are the steps to be followed while checking the lubrication system?
3. Why do leakages occur in lubrication systems?

Session 6: Tuning of Cooling System of an Engine

You must have observed at home that whenever there is rise in ambient temperature, we switch on the fan or AC to reduce the temperature. It makes the environment comfortable to work. Similarly, the cooling system in a car protects the engine from overheating. An efficient cooling system keeps the engine protected and removes 30% of the engine's heat. Overheating of the engine can lead to poor performance, distortion of components and shorter life. Therefore, checking the functioning of the cooling system and the level of coolant, at specified intervals, is a must. During summers, it should be checked more frequently.

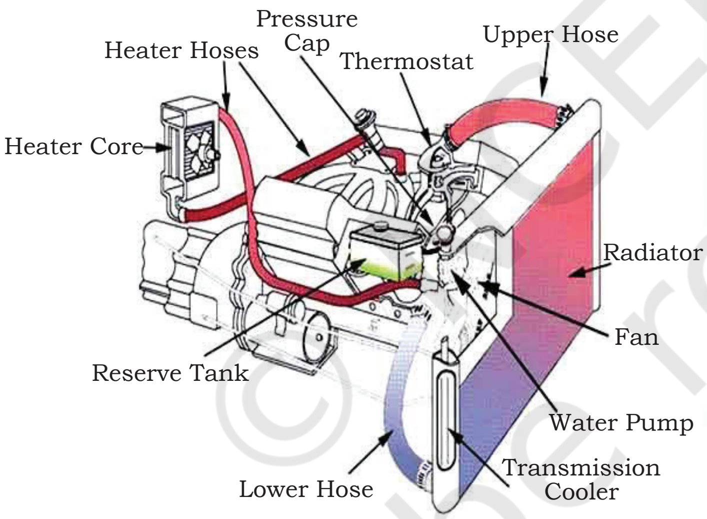

Fig. 5.6: Automobile Cooling System

Steps Involved in Checking the Cooling System

Reading of Temperature Gauge

Temperature gauge is fixed on the dashboard, which regularly monitors the variation in engine temperature. Moderate temperature of engine is 75–80 degree centigrade, which needs to be maintained.

Parts of Cooling System

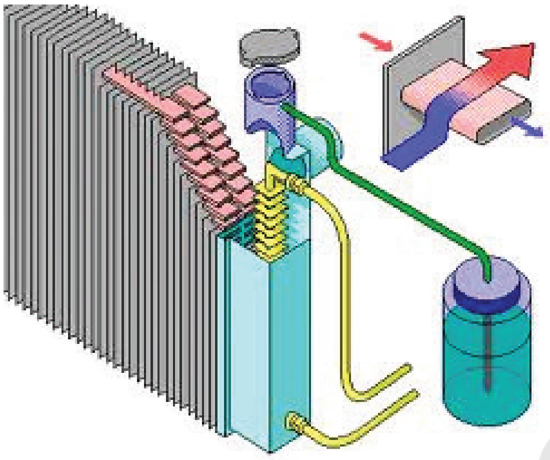

Fig. 5.7: Cooling Circulation

The cooling system of an engine includes the engine's water jacket, water pump, radiator and radiator cap, cooling fan, thermostat, hoses, heater core and overflow tank.

Checking circulation of water in cooling system

- Switch off the ignition switch of vehicle
- Remove the negative terminal from the battery
- Turn the upper radiator cap slowly and allow the steam or water vapour to release from the radiator
- Turn the radiator cap and remove the cap from the neck of the radiator
- Connect the battery terminal and switch on the ignition
- Start the engine at idle speed
- Inspect the circulation of water in the radiator
- Circulation of water should be observed as rate of inlet must be equal to rate of outlet of coolant
- It work healthy running of coolant system

Checking of coolant leakage

- Inspect coolant tank and its connections
- Inspect radiator hose clips for looseness and if leakage is noticed, tighten the clips
- Check hose pipe for distortion or deterioration and replace
- Inspect radiator cap, neck and radiator core for coolant leakage
- Inspect for torn thermostat housing gasket for leakage
- Inspect the water pumps seal and gasket for leakage of coolant

Setting of cooling fan belt tension

- Study belt for cracks and stress, cut deformation, wear and cleanliness. If necessary, change the belt.
- Check belt tension, it should be as 6–7 mm as deflection.

- To adjust the belt, tighten or loosen, change the position of the alternator.
- Tighten belt adjustment bolt and alternator pivot bolt.

Practical Exercise

1. List the steps used in tuning of cooling system.

S.No.	Steps used

2. Draw the line diagram of cooling system of a vehicle.

Check Your Progress

A. Fill in the blanks

1. __________ is used for cooling the vehicle.
2. Normal temperature of an engine is in the range of _____ and ______.
3. The percentage of heat removed by cooling system is ___ %.

B. Multiple choice questions

1. Cooling system in a car protects the engine from ____________.
   (a) overheating
   (b) water heating
   (c) overflow
   (d) None of the above

2. Which of the following is not a part of the cooling system?
   (a) Water jacket
   (b) Water pump
   (c) Radiator and radiator cap
   (d) Axle
3. Cooling fan belt tension are _____________.
   (a) 6–7 mm as deflection
   (b) 7–10 mm as deflection
   (c) 10–60 mm as deflection
   (d) All of the above

C. Answer the following question

1. Why is cooling of an engine necessary?
2. What are the steps to be followed while checking the functioning of the cooling system?

SESSION 7: TIGHTENING OF FASTENERS (NUTS, BOLTS AND SCREW)

As you know, the engine is a complex machinery in which different components are assembled using different types of fasteners. Power production, transmission of power, variation in speed and load, vibration leads to loosening of these fasteners. This may change the stability of the components and lead to bending of the vehicle's engine. Further, it may develop scratches, cracks, and may cause leakage of coolant, gases, etc., and affect the engine's performance.

Tightening of Cylinder Head, Induction Manifold and Exhaust Manifold

To avoid combustion gases, it is necessary to tighten the cylinder head in the following manner:

- Remove the tappet cover from cylinder head.
- Remove the rocker arm assembly.
- Slowly remove the pushrods (overhead valve mechanism).
- Use specific size of socket spanner with appropriate torque wrench.

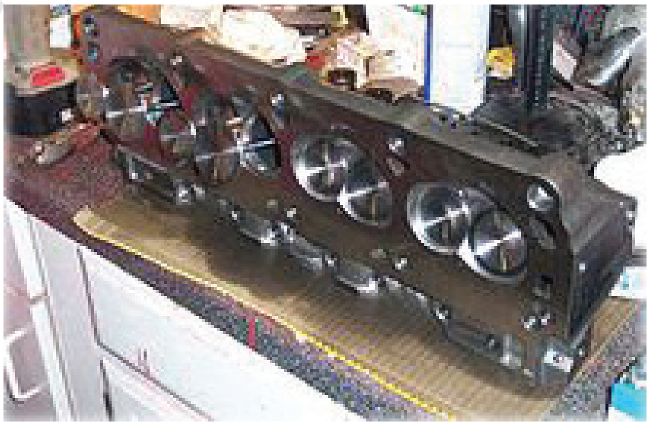

Fig. 5.8: Cylinder Head

- Strictly use the service manual as per the prescribed sequence.
- Tighten the cylinder with a specified torque.

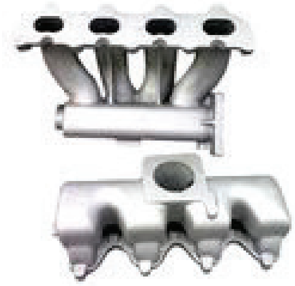
Fig. 5.9: Induction Manifold

Induction Manifold

Loose induction manifold may create vacuum leakage, which leads to supply of lean mixture that causes obstruction in engine running.

- Tighten the induction manifold using the specific size of socket spanner with appropriate torque wrench.
- Use the service manual strictly as per the prescribed sequence.
- Inspect the induction manifold gasket.

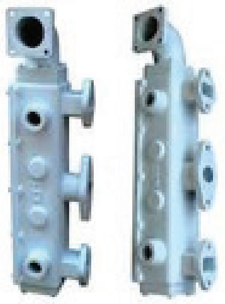
Fig. 5.10: Exhaust Manifold

Exhaust Manifold

Loose induction manifold may cause emission leakage and lead to blackening of bottom and may catch fire.

- Tighten the exhaust manifold by using a specific size of socket spanner with appropriate torque wrench.
- Use strictly the service manual as per prescribed sequence.
- Inspect the exhaust manifold gasket.

Material and Tools Requirement for Tightening of Fastener

- Socket spanner
- Tommey bar
- Extension bar or rod
- Torque wrench
- Torque wrench socket

Practical Activity

1. List the torque required for tightening of fasteners using service manual.

S.No.	Name of component	Tightening torque

Check Your Progress

A. Fill in the blanks

1. Tightening of cylinder head is required to avoid _______.
2. Loose induction manifold may cause emission _________.

B. Multiple choice questions

1. Loose induction manifold may create ________________.
    (a) vacuum leakage
    (b) pressure leakage
    (c) hydraulic leakage
    (d) None of the above
2. Loose induction manifold may cause ________________.
    (a) emission leakage
    (b) vacuum leakage
    (c) Both of the above
    (d) None of the above
3. The material and tools required for tightening of fastener include ________________________.
    (a) socket spanner
    (b) tommy bar
    (c) extension bar or rod
    (d) All of the above
4. Mallet is made of ______________.
    (a) iron
    (b) wood
    (c) steel
    (d) aluminium

C. Answer the following questions

1. What are the different types of tools used in tightening of fasteners?
2. How is the torque wrench set?
3. List the steps used in tightening.

Session 8: Engine Timing (Tuning)

To run the engine smoothly, it is necessary to supply fuel by opening and closing the inlet 'valve'. Similarly it is also needed to remove the exhaust gases from the cylinder. Movements of the valves are related to the crankshaft revolution and engine (otto) cycle. It is necessary to check and set valve timing.

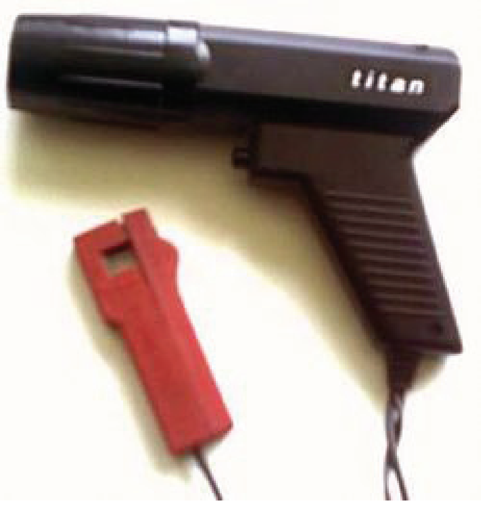

Fig. 5.11: Stroboscope Lamp or Gun

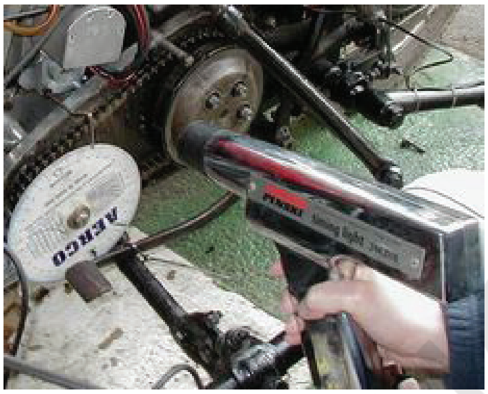

Fig. 5.12: Tuning

For the process of combustion, it is necessary to ignite the charge by using a sparkplug. The plug should ignite the charge at the end of compression stroke. There is a need to set the ignition system in relation to rotation of crankshaft.

Stroboscope Lamp or Gun

It is an instrument used to construct a cyclically moving object (our flywheel) that appears to be slow-moving or stationary. It is used in timing lights to dynamically set the explosion timing of an otto cycle combustion engine. The timing light is connected to the explosion circuit (mostly inductively) and used to illuminate the timing marks with the running engine. The perceptible position of the marks, frozen by the stroboscopic effect, indicates the current timing of the spark in relation to piston position.

These tools come in various shapes, mostly in gun or torch shape. A power supply (230V or 12V) is necessary to run them and they have a pickup unit (mostly an induction clamp to be put around the HT cable for impulse pickup).

In new vehicles, multipoint fuel injection system is used. In the process of combustion of fuel injection system, it is necessary to inject the fuel by using a fuel injector. The fuel injector injects the fuel at the right time at appropriate pressure at the end of compression stroke. There is a need to set the injection timing (FIP) system in relation to rotation of crankshaft. Thus, check and set fuel injection trimming.

Timing maintains the total functioning of the engine and govern the fuel economy.

Steps for Checking of Valve Timing

- Remove the timing cover
- Check the alignment of the following:
  - Turn the crankshaft pulley with the transmission belt. The mark on the pulley must align with the crankcase mark.

– At the same time the camshaft pulley mark must align with the crankcase marking. This indicates proper valve timing.

Steps for Checking of Ignition Timing

- Connect the stroboscope connection as per the prescribed manual.
- Now hold the stroboscope lamp and run the engine and flywheel at idle speed
- Check that the timing mark on the flywheel matches with the pointer of crankcase housing. The time lamp must glow, showing the alignment at the same time.
- This indicates proper ignition timing in the system.

Steps for Checking of Injector Timing

- Check the alignment and the FIP timing with camshaft gears or pulley, which ensures injection timing.

Practical Exercise

1. Visit the service centre and check the valve timing, ignition timing and injection timing of four types of vehicles.
2. Prepare a poster showing valve timing, ignition timing and injection timing of a vehicle.

Check Your Progress

A. Fill in the blanks

1. Valve timing is used for ____________.
2. Ignition timing helps in ____________ of an engine
3. Injection timing is used ____________.
4. Stroboscope helps in ____________ of ignition timing.

B. Multiple choice questions

1. Which component is used in timing lights to dynamically set the explosion timing of an otto cycle combustion engine?
   (a) Stroboscope Lamp or Gun
   (b) Piston
   (c) Ring
   (d) Rotary
2. The fuel injector injects the fuel at the right time at the end of ________________.
   (a) suction stroke
   (b) compression Stroke
   (c) expansion Stroke
   (d) exhaust
3. Full foam of MPFI system ______ ______ ______ ________.
   (a) Multi Point Fuel Injection
   (b) Multi Fuel Point Injection
   (c) Multi Point Fuel Induction
   (d) None of the above
4. What is the full form of CVTI?
   (a) Charged Motion Variable Time Ignition
   (b) Changed Motion Variable Time Ignition
   (c) Combustion Motion Variable Time Ignition
   (d) All of the above

C. Answer the following questions

1. What is meaning of timing?
2. Give the differences between ignition and injection timing.
3. Name tool used in checking engine timing.